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28 December 1962

MEMORANDUM FOR THE RECORD

SUBJECT : TAGBOARD Camera Evaluation

1. At a briefing held in Langley on 8 November 1962 for Eastman Kodak Company, Perkin-Elmer Corporation, Itek Corporation, Hycon Manufacturing Company, and Dynametric Incorporated, the requirements for a high altitude drone reconnaissance system were defined. In response to this briefing proposals were received on 3 December from Eastman Kodak, Perkin-Elmer, Itek and Hycon.

2. Space envelope available for the camera is in the form of a letter T. The stem of the T is lying forward with the T lying flat. Arms of the T extend laterally but are inclined upward 20° from horizontal in a dihedral effect. Each arm is 11 inches in vertical dimension and 18 inches in longitudinal dimension. The over-all length of each arm is 21 inches from the centerline. The stem of the T is 14 inches in diameter. Over-all length is 60 inches. The forward top of the stem is beveled off in a flat cut as viewed from the side removing 16 inches from the top centerline and the top 8 inches from the end of the stem. Weight allocation for camera and film was 420 pounds including auxiliaries. We asked for better than two feet ground resolution at 2:1 contrast, 90° total lateral coverage, 50° of which was to be stereo and 3000 nautical miles of linear coverage. The drone mission would be accomplished at 81 to 95,000 feet altitude and Mach 3.3.

Vehicle environmental details were supplied to the bidders by the drone designer.

Simplicity, reliability and maintenance free operation were stressed as design goals.

It was specified that delivery of the first flight test model was required within twelve months of the contract date.

3. After determining, from a cursory examination of the proposals, that all four approaches were feasible and that the major requirements had been satisfied from a technical standpoint, eight considerations were chosen

that reflect the system usefulness for the mission to be performed. Relative percentage values were assigned to these considerations in accordance with their importance to the mission requirement. A relative order of merit factor from one to four was then assigned to each of these considerations in the order of how well each contractor had proposed his solution. The relative order of merit factor was multiplied by the percentage of importance figure to establish a score. The totals of these scores are submitted as a basis for choosing the successful contractor. The evaluation sheet tabulation is shown in Appendix III. In Appendix II price is plotted against delivery schedule for quantities of 1 plus 3, 1 plus 5, and 1 plus 9. Since two bidders did not quote a price for a single R&D item the ratio of the price of one R&D item to the quantity of 10 price was used to establish the single R&D item price. The eight considerations on the evaluation sheet will be discussed in paragraph 4.

4. Evaluation:

a. Proposal - A value of 10% was assigned to the quality of the proposal. This includes:

(1) Understanding of the problem.
(2) Mechanical solution of the problem.
(3) Comprehensive coverage of factors relating to the problem.

Eastman Kodak had the best proposal.

b. Mission coverage - 10% value.

Eastman Kodak and Perkin-Elmer offered complete mission coverage with the required stereo. Itek accomplished the 3000 mile linear coverage only with .0015 thickness film which is not only difficult to handle but is not currently in stock. Hycon offered only 28 miles lateral coverage as compared to 30 nautical miles by Eastman Kodak and Perkin-Elmer.

c. Reliability - 10% value.

Eastman Kodak's proposal and Hycon's proposal were judged equally reliable from the standpoint of simplicity and mechanical probability of failure standpoint. Itek's rotating folded optical system is probably the least reliable of the panoramic systems due to the need for synchronizing film speed lens rotation, oscillating mirror and a revolving scan arm.

d. Price and delivery

A 20% value was placed on price and a 10% value on delivery. Appendix II shows delivery schedules and prices. Hycon offered to build the development article under a CPFF contract with subsequent models under a fixed price incentive payment arrangement, however, their quote did not include ground support equipment and check out consoles while limited test and support equipment is included in the other proposals. Even so, the quotes of Perkin-Elmer and Hycon are less than half of the other bidders.

e. Past performance - 10% value.

This rather nebulous consideration is evaluated on the basis of facts, rumor, intuition, recent history and horseback opinions. All four companies have had their share of successes and failures.

(1) Perkin-Elmer has had an excellent record with the IDEALIST tracker camera, and over the years have produced outstanding optical elements for many applications; however, in the development of the OXCART camera they have had a continuing history of overruns, slipped delivery schedules, expensive support requirements and unrealistic design goals. Primarily an optical equipment organization whose concern with optical excellence has led them to ignore or avoid the realities of organization, flight test, mechanical simplicity, and field operational conditions.

(2) Itek is similar to Perkin-Elmer in many respects, only on a larger scale. They rely on executive sales for most of their income. They are university oriented. Many of their management types are former college professors whose years in the academic halls have insulated them against the stern realities of competition in the market place. As a consequence they are more concerned with technical sophistication and excellence then they are with reliability, quality control, production schedules, and dollar value. This observation is no reflection on their excellent technical qualifications, but the fact is that without Government support they would go bankrupt through their inability to compete with other companies in the same business.

(3) Eastman Kodak - From the standpoint of past performance, over-all stability and general reliability this company is given the highest rating; however, having such a company as this in the central position that it occupies not only processing all of the intelligence film, but producing and competing in the design of

processing machinery, photographic interpretation equipment and cameras, as well as supplying all of the film, is awkward to say the least.

(4) Hycon has done a commendable job with the "B" camera although some of their other efforts for the Air Force and the Navy have been less successful. Generally speaking, Hycon being neither a manufacturer of lenses nor of film, could be expected to concentrate on the marriage of the lens film combination in a camera design.

f. Resolution

Since the primary purpose of this design competition is to obtain high resolution photographs of the ground, then the better this is accomplished the more valuable is the system. A value of 20% was placed on the system resolution offered by the bidders. Perkin-Elmer and Eastman Kodak came up with essentially the same ground resolution, both of which were less than the other two bidders. Hycon's resolution figure was slightly less than that of Itek's. All ground resolution figures were at low contrast, medium atmosphere conditions and included total system, and these figures cannot be guaranteed since the vehicle environment is not fully established.

g. Other considerations - 10%

Lumped into this category are variable indeterminates such as:

(1) Security problems.
(2) Are additional facilities required?
(3) Will special P.I. handling equipment be required?
(4) Will it be necessary to clear people for more projects than is desirable?
(5) How much technical and administrative support must be provided?

5. While it is impossible to be completely impartial and objective, the above method of evaluation permits the evaluator to avoid bias in favor of friends, personal associations, or who needs the business most.

6. It will be noted from the evaluation sheet Appendix III, that Itek was fourth, Perkin-Elmer third, Eastman Kodak second, and Hycon first, although second, third and fourth places were very close together.

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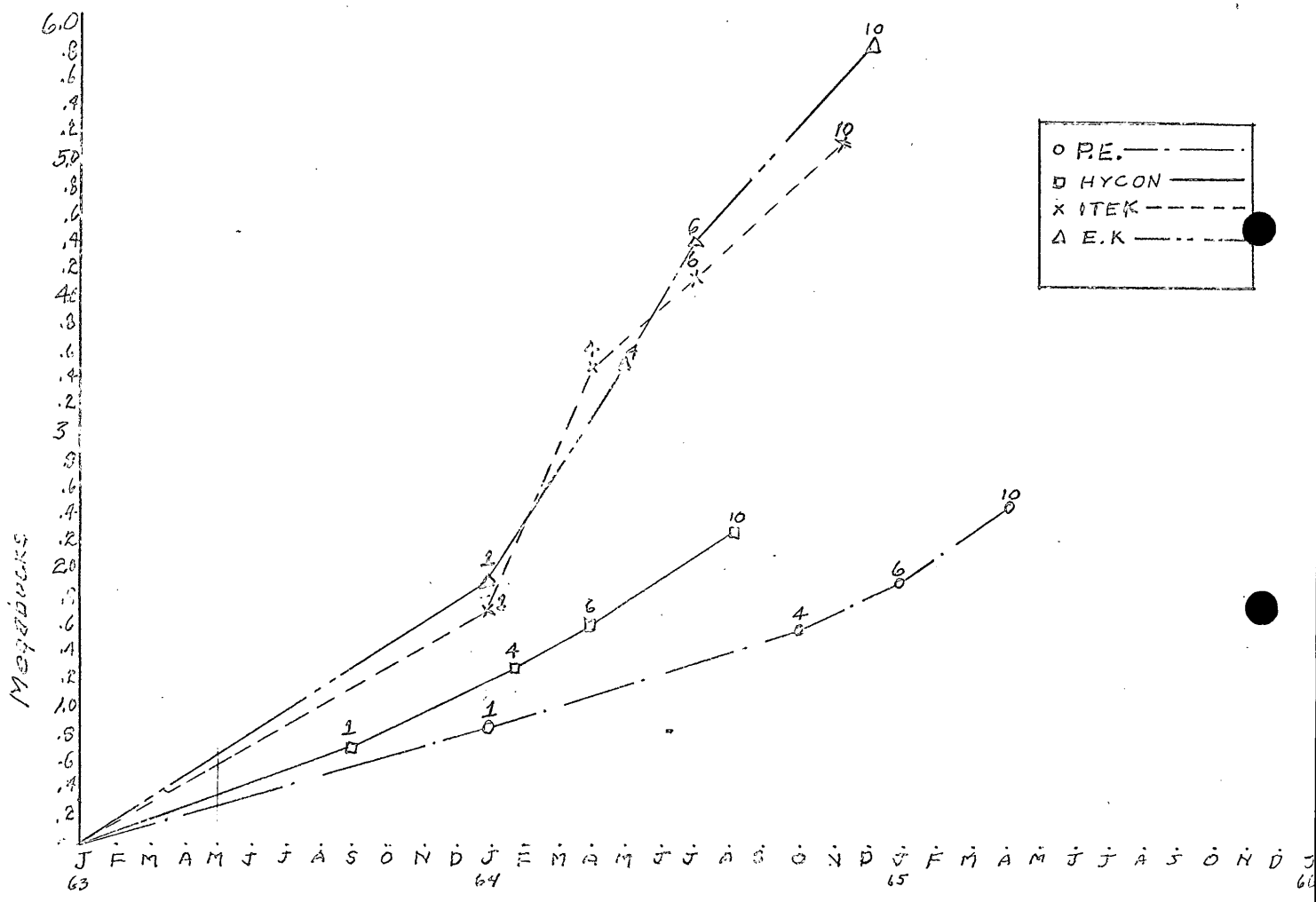
[redacted]
Development Division
OSA-ED/R

EQUIPMENT	[illegible]	[illegible]	[illegible]	PERKIN ELMER
CAMERA TYPE	SLIT SWINGING MIRROR PANORAMIC	3 AND 5 POSITION FRAMING	PANORAMIC ROTATING FOLDED OPTICAL SYSTEM FRONT MIRROR	ROTATING PANORAMIC LENS
WEIGHT	325 lbs	385 lbs	262 lbs	325 lbs
LENS TYPE	PACIFIC OPTICAL REFRACTOR	BAKER DESIGNED REFRACTOR	PETZVAL ROTATING	BAUER CONCENTRIC CATADIOPTRIC
FOCAL LENGTH	18" f5.6 (T7.0)	24" f 5.0 (T6.2)	24" f 3.5 (T3.9)	12" f 1.5 (T.2.8
TOTAL ANGLE	28°	21° 14'	20°	10°
Low Contrast Resolution AWAR	120/mm – 170/mm	160/mm – 215/mm	140/mm – 180/mm	200/mm
FILM TYPE	SO-132	SO-132	SO-206 OR SO-130	SO 132
LENGTH	2310'	4500'	7,600 (.0025) 11350 (.0015)	4400'
WIDTH	9.5"	9.5"	70mm	70mm
TOTAL SQ. FT.	1646□'	3380□'	1748□'	658□'
FORMAT	9" X 28.5"	9" x 9"	2.1" x 37.7"	2.1" x 18.8
NO. FRAMES	924	5680	2420	2400
CYCLE PERIOD	6.5 Sec.	0.9 to 1.18 Sec	1.25 Sec	2.26 Sec
SYSTEM RESOLUTION	1.83' to 2.5'	1.25	1' to 1.4	1.8 TO 2.5
COVERAGE LATERAL	30 N.M	28 N.M.	20 TO 22 NM	30 N.M
STEREO OVERLAP	90°	91°	50°	90°
CONVERGENT	14°	14°	16°	14½°
MISSION LENGTH	3000 NM	3020 NM	2000 NM (.0025 FILM) 3000 NM (.0015" FILM)	3000 NM
DATA RECORDING	YES	YES	YES	YES
IMC STABILIZATION	COS VARIDRIVE ROLL & PITCH	MIRROR SLEW ROLL + PITCH	LENS FILM DRIVE RIGID MOUNT	FILM TILT NONE
EFFECTIVE SHUTTER SPEED	~~1/25~~ ~~1/50~~ 1/100 1/200	1/250 1/500 1/1000 1/1000	1/500 1/1000 1/2000 1/4000 1/8000	1/1200
SPECIAL FEATURES	LENS AUTOFOCUS	VARIABLE CURTAIN FOCAL PLANE	AUTO EXPOSURE CONTROL	VARIABLE FILM VELOCITY

H

NO ; FOR BALANCE
BUT DOES NOT INCLUDE GROUND SUPPORT EQUIPMENT
E.K. R.E. & ITEK PROPOSE OFF CONTRACT FOR ALL ITEMS BUT INCLUDE
LIMITED SPECIAL TEST EQUIPMENT



III

RELATIVE ORDER OF MERIT FACTOR

EXCELLENT	4
GOOD	3
FAIR	2
POOR	1

EVALUATION SHEET

CONSIDERATION	VALUE %	EASTMAN FACTOR	EASTMAN SCORE	HYCON FACTOR	HYCON SCORE	ITEK FACTOR	ITEK SCORE	PERKIN ELMER FACTOR	PERKIN ELMER SCORE
PROPOSAL	10	4	40	2	20	3	30	1	10
MISSION COVERAGE	10	4	40	3	30	1	10	4	40
RELIABILITY	10	4	40	4	40	1	10	2	20
PRICE	20	1	20	4	80	2	40	3	60
DELIVERY	10	3	30	4	40	3	30	2	20
PAST PERFORMANCE	10	4	40	3	30	3	30	2	20
OTHER CONSIDERATIONS (Security Facilities & Support)	10	1	10	3	30	2	20	4	40
RESOLUTION	20	2	40	3	60	4	80	2	40
TOTALS	100	23	260	26	330	19	250	20	250
		2ND	2ND	1ST	1ST	4TH	3RD	3RD	3RD